The Vector Library Testing of Feldspar Programming Language Based on Axiomatic Semantics

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This paper is a part of a project which defines a high level domain specific (DSL) language (Feldspar) embedded in Haskell that allows description of digital signal processing (DSP) algorithms and has special characteristics [2]. Vector library is the front-end of Feldspar, it contains standard list functions. Examples written in Feldspar are being compiled to a intermediate representation called core output. The advantage of this step is that the core language can be easily compiled to an imperative language [1]. The goal of the research was to test the Vector library of the Feldspar programming language and to check the equivalence of the Feldspar compiler and the Feldspar interpreter. The result of this paper is a testing method, which is checking the equality of the Feldspar interpreter and compiler with property based unit testing. The method is using a developed testing software which generates random data using QuickCheck and after that it verifies the Feldspar axioms [3]. Furthermore, we developed 80 axioms implemented in Feldspar, which describe the properties of the functions from the Vector library. Finally we ran each axiom for 100 random input data with the testing software, measured and interpreted the output. The research was done using the Glasgow Haskell Compiler (GHC), the Haskell QuickCheck property based testing tool and the Feldspar programming language, with its compiler and interpreter.

Acknowledgements

This work was supported by KMOP-2008-1.1.2, Ericsson Software Research and Ericsson Business Unit Networks SSF.

References

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